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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,671	01/06/2005	Young-Geun Park	PARK3031/REF	2611
23364	7590	05/11/2006	EXAMINER	
BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			DINH, THU HUONG T	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 05/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/519,671

Applicant(s)

PARK ET AL.

Examiner

Thu-Huong Dinh

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01/06/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.


Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.


WALTER LINDSAY JR.
PRIMARY EXAMINER

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 4/22/05.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This Office Action is response to a 371 of PCT/KR04/00741 filed on January 06, 2005.

Current Claims 1 to 12 (original) and 13 –20 (new) are pending.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1-2, 6- 13 and 17 to 20 are rejected under 35 U.S.C. 102(a) as being anticipation by Matsuyama (U.S. Patent No. 6,415,653 dated July 9, 2002).

3. Matsuyama teaches the followings for Claim 1: (a) forming a first mask pattern (112)(Column 7, line 22) for defining a probe tip (Column 11, line 8-21) on a wafer (108)(Column 7, line 7) including a handle layer (102) (Column 7, line 10) on which a mounting block of the probe (122) (Column 7, line 54-55) is formed, an insulating film (104)(Column 7, line 16) on the handle layer (102) and a device layer (108) (Column 7, line 34) in which a cantilever (142) (Column 8, lines 43-44) and a probe tip (Column 11, line 8-21) of the probe (138) are formed (Column 9,lines 19-21); (b) forming a second mask (116) (Column 7, line 42) for defining the cantilever (142) (Column 8, lines 43-44) of the probe (138) (Column 9,lines 19-21) on the device layer (108) (Column 7, line 34) and the first mask (112) (Column 7, line 22); (c) etching the device layer (108) by using the first (112) and the second mask (116) as patterns (Column 7, lines 22 and 42); (d) removing the second mask (116) (Column 7, lines 64-65)(Column 8, lines 18-19 and

Art Unit: 2812

29); (e) forming a sidewall passivation layer (132) on a sidewall of the device layer (128) (Column 8, lines 18-19 and 28-29); (f) etching the device layer (108) by using the first mask (112) as a pattern (Column 7, line 22) while leaving a thickness thereof as much as a thickness of the cantilever (142) (Column 7, lines 23-25); (g) *removing the first mask (112) ; it's understood the mask is removed once the etching process is completed*; (h) *forming the probe tip (Column 11- lines 8-21)by performing a wet etching process (Column 7, lines 66-67 and Column 8, lines 1-4) on the device layer (108)*; (i) *removing the sidewall passivation layer (128) (Column 8, line 26)*; (j) *forming a third mask (110) (Column 7, line 18) for defining the mounting block of the probe (130) on a lower surface (Column 7, line 20) of the handle layer(102)(Column 7, line 21)*; (k) *etching the handle layer (136) by using the third mask (110)as a pattern (Column 13, lines 59-62)*; and (1) *removing the third mask (110). It's understood the mask is removed once the etching process is completed. In addition, Matsuyama shows that:*

1)... *wherein the wafer is an SOI (silicon on insulator) wafer (108) (Column 7, line 7) including a device layer containing (111) single-crystalline silicon (Column 8, line 9), an insulating oxide film (104) (Column 7, line 15) and a handling layer containing (100) single-crystalline silicon (Column 8, line 10) (Claims 2 and 13),* 2)... *wherein in the step (c), an aspect ratio of the probe tip is determined depending on an angle formed by the sidewall (144) (Column 10, lines 41-45) of the etched device layer and an upper surface (126) (Column 10, lines 46-51 and lines 60-65) of the insulating layer (Claims 6 and 17);*

3)... *wherein the sidewall passivation film is formed by growing a wet thermal oxide film or a silicon nitride film on the sidewall of the device layer (Column 8, lines 21-24)*

Art Unit: 2812

(Claims 7 and 18); 4)... wherein in the step (h), the probe tip is formed by defining a (111) surface by employing a wet etching method (Column 8, lines 8-10) using a KOH solution, a TMAH (tetramethyl ammonium hydroxide) solution or the like (Column 8, lines 4-7) (Claims 8 and 19); 5)... wherein in the step (j), the third mask (110) is formed by using a silicon oxide film or a silicon nitride film (Column 7, lines 18-21) (Claims 9 and 20); 6)... wherein in the step (k), the handle layer is etched by using a wet etching method (Column 9, lines 28-30) or a dry etching using the DRIE (Claim 10); and 7)... further comprising the step of oxidation process on a surface of the device layer to sharpen the probe tip after performing the step (i) (Column 11, lines 9-16) (Claim 11).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 3-4 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuyama (U.S. Patent No. 6,415,653 dated July 9, 2002 as applied to claim 1 above, and further in view of Soh et al. (U.S. Patent No. 5,618,760 dated April 8, 1997).

Matsuyama shows the structure substantially as claimed and as described in the preceding paragraphs. However, he lacks anticipation only in not explicitly teaching that: 1)... wherein the first mask uses a wet thermal oxide film or a TEOS oxide film (Claims 3 and 14); 2)... wherein the second mask is a TEOS oxide film, a metal film using Cr or Al, or a PR (photoresist) layer (Claims 4 and 15).

Soh et al. teaches the conventional masking technique to grow an oxide film by etching with an HF solution for 6.0 to 6.5 minutes (Column 4, lines 66-67 and Column 5, lines 1-4) (Claims 3 and 14). In addition, Soh et al. teaches the material that oxidizes under the influence of an SPM tip may be used for the top layer, including metals such as Cr, Al (Column 8, lines 50-54) (Claims 4 and 15).

Both Matsuyama and Soh et al. are analogous art because they both from the same field of endeavor of Scanning Probe Microscope. At the time of invention it would have been obvious to a person of ordinary skill in the art to implement Soh et al. teaching of the etching a pattern on a substrate with Matsuyama's teaching of having a cantilever for use in a scanning probe microscope includes a lever portion having a probe portion made from a semiconductor substrate. The motivation in doing so would result in providing a cantilever having a sharp and long probe which easily prevents contact between a supporting portion of the cantilever and a sample to be measured.

6. Claims 5 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Matsuyama (U.S. Patent No. 6,415,653 dated July9, 2002 as applied to claim 1 above, and further in view of Ayazi et al. (U.S. Patent No. 6,909,221 filed July 31, 2003).

Matsuyama shows the structure substantially as claimed and as described in the preceding paragraphs. However, he lacks anticipation only in not explicitly teaching that: 1)... wherein in the step (c), the device layer is etched by employing a dry etching method using a DRIE (deep reactive ion etching) (Claims 5 and 16).

Ayazi et al. teaches the etching can be performed by using deep reactive ion etching (DRIE) (Column 7, line 27).

Both Matsuyama and Ayazi et al. are analogous art because they both from the same field of endeavor of Semiconductor material. At the time of invention it would have been obvious to a person of ordinary skill in the art to implement Ayazi et al. teaching of the etching method to Matsuyama's teaching of using a cantilever in a scanning probe microscope in order to constantly fabricating a cantilever including a lever portion which has a resonance frequency in the order of MHz and a spring constant of 40-50 N/m or smaller.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kitazawa et al. (U. S. Patent No. 6,918,286 filed May 8, 2002) teaches SPM Cantilever. Quate et al. (U.S. Patent No. 5,066,358 dated November 19, 1991) teaches Nitride Cantilevers with Single Crystal Silicon Tips. Akamine et al. (U.S. Patent No. 5,021,364 dated June 4, 1991) teaches Microcantilever with Integral Self-Aligned Sharp Tetrahedral.

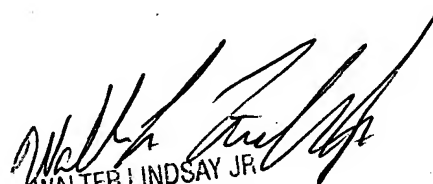
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thu-Huong Dinh whose telephone number is 571 272-9014. The examiner can normally be reached on Monday through Friday (8:30AM-5:00PM Eastern).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2812

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

thd


WALTER LINDSAY JR.
PRIMARY EXAMINER